National Aeronautics and Space Administration

GoddardView

Volume 9 Issue 5
May 2013

NASA, Orbital Launch Antares Rocket

Pg 3

Hearing a Speck of Dirt

Pg 4

Experiment Examining a SLICE of the Interstellar Medium

Pg 9

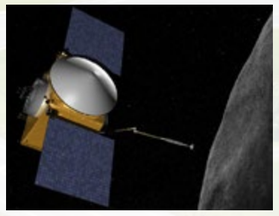
www.nasa.gov

GoddardView

THE WEEKLY

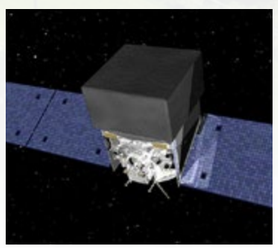
Send Names and Messages to Mars
NASA is inviting the public to submit their names and a personal message for a DVD to be carried aboard a spacecraft that will study the Martian upper atmosphere. NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft is scheduled for launch in November. To participate, click on the image of MAVEN.

Rover Prototype To Explore Greenland Ice Sheet
GROVER, which stands for both Greenland Rover and Goddard Remotely Operated Vehicle for Exploration and Research, will roam the frigid landscape collecting measurements to help scientists understand changes in the massive ice sheet. Click on the rover to learn more.



NASA Spacecraft Will Visit Asteroid with New Name
OSIRIS-REx will visit the asteroid now called Bennu, an ancient Egyptian avian deity. OSIRIS-Rex is scheduled to rendezvous with Bennu in 2018. Click the image for more on OSIRIS-REx.

The Day Fermi Dodged a 1.5-ton Bullet
NASA scientists don't often learn that their spacecraft is at risk of crashing into another satellite. But when Julie McEnery, project scientist for NASA's Fermi Gamma-ray Space Telescope, checked her email, she found herself facing this exact situation. Learn more—click on the image of Fermi.



CONTENTS

On the cover: NASA commercial space partner Orbital Sciences Corporation launched its Antares rocket on Sunday, April 21, from the new Mid-Atlantic Regional Spaceport Pad-0A at the Wallops Flight Facility.
Photo credit: NASA/Terry Zaperach

GoddardView

Goddard View is an official publication of NASA's Goddard Space Flight Center. Goddard View showcases people and achievements in the Goddard community that support Goddard's mission to explore, discover, and understand our dynamic universe. Goddard View is published weekly by the Office of Communications.

News items for publication in *Goddard View* must be received by noon Wednesday of each week. You may submit contributions to the editor via e-mail at john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

NASA, ORBITAL LAUNCH ANTARES ROCKET

NASA commercial space partner Orbital Sciences Corporation launched its Antares rocket at 5:00 p.m. EDT on April 21 from the new Mid-Atlantic Regional Spaceport Pad-0A at Wallops Flight Facility.

The test flight was the first launch from the pad at Wallops and was the first flight of Antares, which delivered the equivalent mass of a spacecraft, a so-called mass simulated payload, into Earth's orbit.

"Today's successful test marks another significant milestone in NASA's plan to rely on American companies to launch supplies and astronauts to the International Space Station, bringing this important work back to the United States where it belongs," said NASA Administrator Charles Bolden. "In addition to providing further evidence that our strategic space exploration plan is moving forward, this test also inaugurates America's newest spaceport capable of launching to the space station, opening up additional opportunities for commercial and government users.

"President Obama has presented a budget for next year that ensures the United States will remain the world leader in space exploration, and a critical part of this budget is the funding needed to advance NASA's commercial space initiative. In order to stop outsourcing American space launches, we need to have the President's budget enacted. It's a budget that's good for our economy, good for the U.S. Space program—and good for American taxpayers."

The completed flight paves the way for a demonstration mission by Orbital to resupply the space station later this year. Antares will launch experiments and supplies to the orbiting laboratory carried aboard the company's new Cygnus cargo spacecraft through NASA's Commercial Resupply Services (CRS) contract.

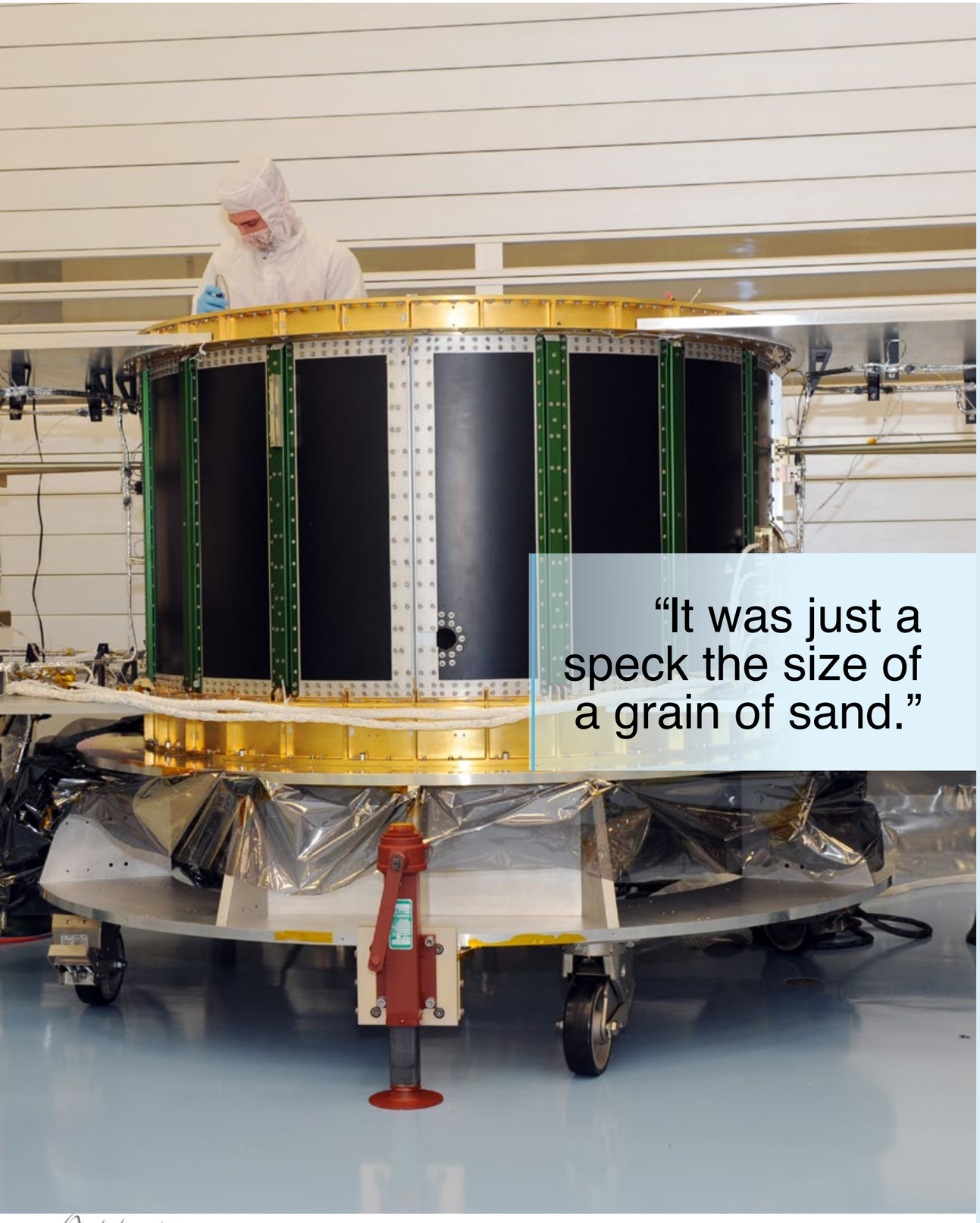
"Today's successful test flight of Orbital Sciences' Antares rocket demonstrates an additional private space-launch capability for the United States and lays the groundwork for the first Antares cargo mission to the International Space Station later this year," said John Holdren, director of the Office of Science and Technology Policy.

"I congratulate Orbital Sciences and the NASA teams at Wallops, and look forward to more groundbreaking missions in the months and years ahead."

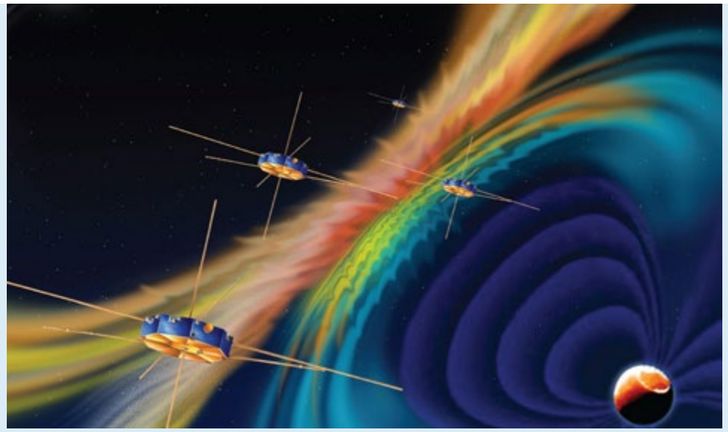
Orbital is building and testing its Antares rocket and Cygnus spacecraft under NASA's Commercial Orbital Transportation Services (COTS) program. After successful completion of a COTS demonstration mission to the station, Orbital will begin conducting eight planned cargo resupply flights to the orbiting laboratory.

NASA initiatives, such as COTS, are helping to develop a robust U.S. commercial space transportation industry with the goal of achieving safe, reliable and cost-effective transportation to and from the International Space Station and low-Earth orbit. NASA's Commercial Crew Program also is working with commercial space partners to develop capabilities to launch U.S. astronauts from American soil in the next few years. ■

Above: The Antares rocket blasts skyward from Wallops Flight Facility. Photo credit: NASA/Terry Zaperach



“It was just a speck the size of a grain of sand.”



HEARING A SPECK OF DIRT

By: Elizabeth Jarrell

Combining the traditional research method of simply listening with their ears together with the recording capability of the modern smart phone, the Magnetospheric MultiScale mission team saved the day and probably even the mission.

The problems began during routine testing. A motor jammed on one of the spin plane double probes, which contain the critical sensor or measuring device to be tethered 197 feet (60 meters) from the spacecraft. An observant team member had noticed that the motor on that particular probe had sounded ever so slightly differently from some of the others. “It was the sort of sound made by a car engine running roughly when it needs to be serviced,” said MMS systems engineer Peter Spidaliere.

The team took apart that particular motor only to find a very small piece of debris in the gear. “It was just a speck the size of a grain of sand that turned out to be a piece of metal left over from the welding process,” Spidaliere said.

The MMS mission will examine the energy transfer between the sun’s and Earth’s magnetic fields, research which is important for telecommunications networks, GPS navigation systems and even electrical power grids. Goddard is building four identical satellites, each with 25 instruments. The University of New Hampshire is building the 16 spin plane double probes containing the sensors.

Everything associated with the instrument is on a very small scale. Each entire instrument is the size and shape of a Quaker Oats canister. The probes themselves are the size of a fist. The motor, which has the critical job of deploying the probe, is only the size of a thumb. Even the sound of each individual motor is hard to hear much less differentiate and quantify.

After finding the speck in the motor that had jammed, the team decided to listen to all 16 spare motors to hear if any of the others also sounded like they were running roughly. After that, they planned to disassemble and examine each for any small debris. The human ear was sufficient to hear the difference in at least that one motor, but the team needed to actually quantify all such differences in every single motor by identifying the unique acoustic signature associated with each motor. The success of their entire mission depended on this data.

The team needed to do a fast, preliminary audio test, but didn’t have access to their sophisticated equipment at that particular moment. The team decided to use Frost’s personal smart phone, because it had an audio analysis application already installed. “It was quick, it was there, so we used it,” said Colin Frost, senior research project engineer, University of New Hampshire. Frost calls his smart phone the “Swiss army knife of electronics.”

The team could not hear any differences between the remaining motors using their ears, but their statistical analysis of the sound revealed one motor with an acoustic profile that was also very different from that of the others. After taking apart that motor, the team found another speck of debris even smaller than the first.

“We were delighted that the University of New Hampshire team solved the problem,” Spidaliere said. “They do fantastic technical work coupled with excellent common sense and lots of creativity. Using the smart phone as a recorder was positively brilliant!”

As a result, the team will now listen to all of the motors and each instrument. Another team may even listen to the thrusters to determine if their valves are opening and closing as commanded. They are not sure what they will hear, but they will be listening and analyzing for any differences, smart phones close at hand. ■

Opposite: The MMS 3 thrust tube and propulsion module in one of Goddard’s clean rooms. Photo credit: NASA/Goddard/ Barbara Lambert

Above: An artist’s rendition of MMS as it sweeps through a magnetic reconnection event caused when the solar wind meets Earth’s magnetic fields. Image credit: Southwest Research Institute

TESTING THE WEBB TELESCOPE'S MIRI THERMAL SHIELD

By: Laura Betz

NASA engineer Acey Herrera recently checked out copper test wires inside the thermal shield of the Mid-Infrared Instrument, known as MIRI, that will fly aboard NASA's James Webb Space Telescope. The shield is designed to protect the vital MIRI instrument from excess heat. At the time of the photo, the thermal shield was about to go through rigorous environmental testing to ensure it can perform properly in the extreme cold temperatures that it will encounter in space.

Herrera is working in a thermal vacuum chamber at NASA's Goddard Space Flight Center in Greenbelt, Md. As the MIRI shield lead, Herrera along with a thermal engineer and cryo-engineer verify that the shield is ready for testing.

On the Webb telescope, the pioneering camera and spectrometer that comprise the MIRI instrument sit inside the Integrated Science Instrument Module flight structure, that holds Webb's four instruments and their electronic systems during launch and operations.

Webb is designed to obtain images and spectra in infrared light that is invisible to the human eye. As a consequence, the Webb telescope and ISIM must be cooled to a very low temperature (-383 F or -230 C) in order to avoid being blinded by their own infrared emission. The MIRI operates over longer infrared wavelengths than the other Webb instruments and, as a result, must be made approximately 35 degrees colder than the rest of the ISIM. The MIRI's thermal shield is critical to achieving this lower temperature for the MIRI.

Herrera said the copper wires he's looking at are located inside the silver box, are important for regulating the temperature of a mock-up of the MIRI instrument enclosed by the shield.

"The wire harness or black coils, half hidden from view at the front, is part of ground support equipment to a heat flow meter that helps regulate and monitor cooling of our test payload," Herrera said. In the left of the photo are lines that will be filled with liquid helium that will cool the chamber.

Surrounding the shield are tangles of cables that provide power to heaters and lead to temperature sensors that will help control and assess how the shield intercepts heat. Parts of the MIRI thermal shield are covered with aluminized thermal blanketing material to keep them cooler.

Inside the thermal vacuum chamber, all of this hardware was tested in an environment that mimics the strong vacuum and cold temperatures that Webb will experience in space. After Herrera and the others finished setting things up in the test chamber, Goddard technicians sealed it up, evacuated all the air and lowered the temperature of the equipment to 18 to 23 kelvins (-427 F or -255 C).

"The heaters here regulate the temperature of this huge, black painted test plate," said Herrera. "The copper wires in the center lead to a mockup meant to represent the volume of the MIRI instrument which will be enclosed in the MIRI shield."

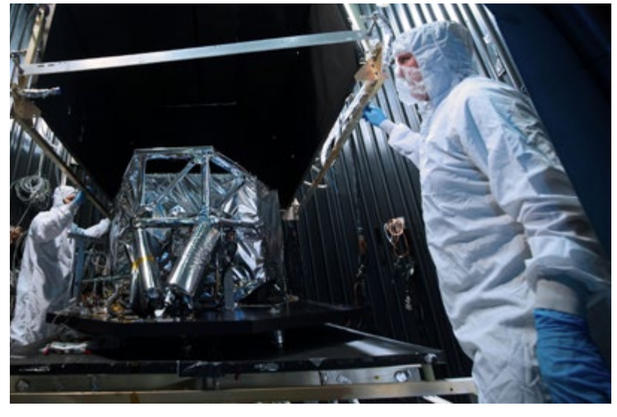
The two black cylindrical parts at the front are protective pads covering two of six composite struts that will attach to ISIM; the pads will be removed before flight.
"These struts are designed to limit the conducted heat flow into the shield from ISIM," said Mark Voyton, MIRI instrument manager at NASA Goddard. "Underneath the shield is a black rectangular piece, part of the thermal shroud that mimics the MIRI shield's environment."

Engineers then used a Q-meter, a device designed to maintain temperature and measure the heat flow, to monitor the instrument. The test took three weeks to complete.

The James Webb Space Telescope is the successor to NASA's Hubble Space Telescope. It will be the most powerful space telescope ever built and will observe the most distant objects in the universe, provide images of the first galaxies formed, and see unexplored planets around distant stars. The Webb telescope is a joint project of NASA, the European Space Agency and the Canadian Space Agency. ■

Above: NASA engineer Acey Herrera checks out copper test wires inside the thermal shield of the Mid-Infrared Instrument, known as MIRI. Photo credit: NASA/Goddard/Chris Gunn

Below: MIRI has a heat shield that is designed to protect the vital instrument from excess heat. This photo shows the Helium Shroud being lowered onto the shield for a test in one of Goddard's vacuum chambers. The Helium Shroud is nicknamed the "Doghouse." Photo credit: NASA/Goddard/Chris Gunn



GCDC CELEBRATES WEEK OF THE YOUNG CHILD

By: Shamara Thornton

At the Goddard Child Development Center (GCDC), accredited by the National Association for the Education of Young Children (NAEYC), every week is the week of the young child. But throughout the week of April 10-16, teachers added a few enrichment projects. The children and teachers at GCDC were celebrating The Week of the Young Child (WOYC).

The Week of the Young Child is a time to recognize that children's opportunities are our responsibilities, and to recommit ourselves to ensuring that each and every child experiences the type of early environment—at home, at child care, at school, and in the community—that will promote their early learning.

From listening to Goddard employees read uplifting books to having a picnic lunch with their parents and classmates, GCDC students spent the week getting inspired and learning just how unique and treasured they are.

Judy Bruner, Director of Safety and Mission Assurance, said, "Goddard Day Care Center is providing a wonderful, nurturing environment for the young children of our Goddard employees. It is clear when you walk into the center that the children are provided many learning experiences and that they are having fun in the process."

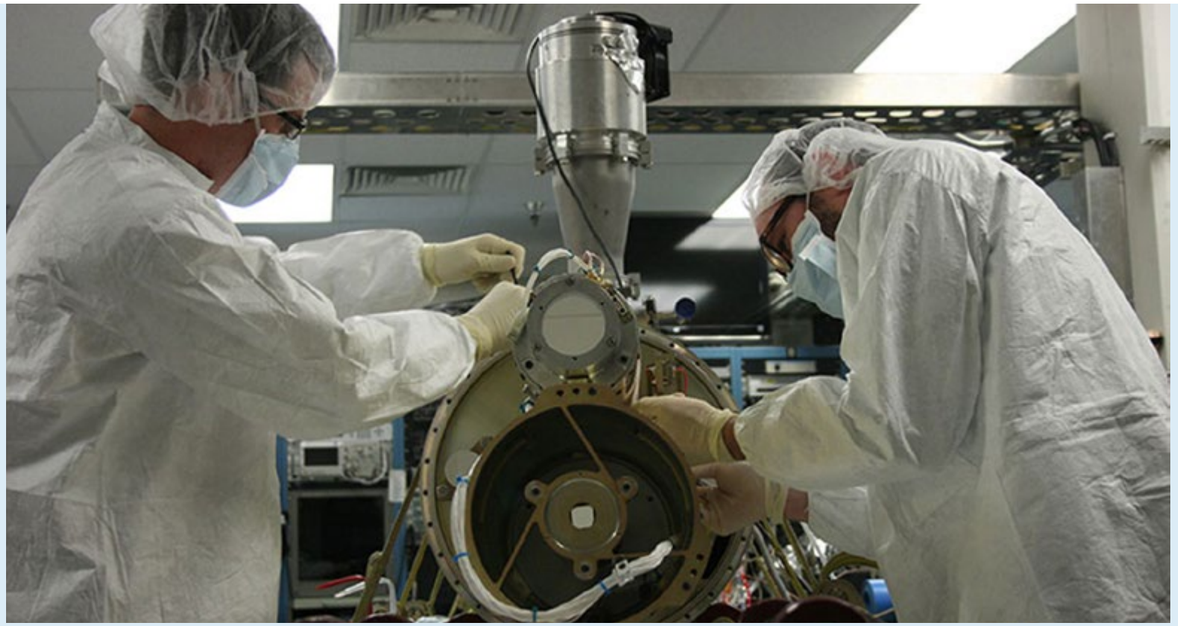
In keeping with this year's WOYC theme, "Early Years are Learning Years," the Goddard Child Development Center invited parents and senior management guest readers into all of the classrooms to participate in activities.
Syretha Storey, Director of GCDC, said, "All activities were planned with input from our students. We also invited GSFC leadership to join the celebration as guest readers. The children enjoy hearing a variety of stories from a variety of readers. Our guest readers never disappoint. They really get into it. They share stories, dress up in the theme of the day and read with excitement."

During the week, GCDC classrooms were filled with the laughter and smiles of children, but also from the adults who care for them outside of school on a daily basis.
Human Capital Management Director Ron Brade, who read the book "One Love," based on the song by Bob Marley, appreciated the opportunity to participate in the week. "It's become a production for me because of how easy it's been to get in the character of the books I've read this year and last," Brade said.

Other guest readers included Safety and Mission Assurance Director Judy Bruner, Applied Engineering And Technology Director Dennis Andrucyk, Deputy Director Rick Obenschain, Information Technology and Management Director Adrian Gardner, Deputy Center Science Director Colleen Hartman, and Special Assistant for Diversity Dan Krieger.

The Week of the Young Child is an annual celebration sponsored by the NAEYC, the world's largest early childhood education association. The NAEYC has nearly 80,000 members and a network of over 300 local, state, and regional affiliates. ■

Above: Information Technology and Management Director Adrian Gardner reads "The Cat in the Hat." Photo credit: NASA/Goddard/Debora McCallum



EXPERIMENT EXAMINING A SLICE OF THE INTERSTELLAR MEDIUM

By: Keith Koehler

When you look up at the stars at night, the space between stars looks empty. But there is something there. It's called the interstellar medium. An experiment from the University of Colorado will fly on a NASA suborbital sounding rocket from the White Sands Missile Range in New Mexico on December 15 to study this space between the stars.

The Sub-orbital Local Interstellar Cloud Experiment (SLICE) will use an 8-inch diameter telescope and spectrograph covering the far-ultraviolet wavelength range from 102–107 nautical miles.

Kevin France, the SLICE principal investigator from Colorado, said "We hope to observe four hot stars in the constellations of Orion and Taurus. We use these stars as background sources to study the composition, temperature, and ionization state of material in the interstellar medium."

"This particular ultraviolet spectral window can only be accessed from space. These spectra will enable us to measure several phases of the interstellar medium: from the cool molecular gas that will eventually form the next generation of stars, to the hot gas that is driven into the interstellar medium when massive stars die in supernova explosions," he said.

So, why the interest in this space in space? The immediate interstellar environment determines the structure of the heliosphere. The heliosphere controls the cosmic ray flux seen in the inner solar system which has a profound effect on the Earth, influencing cloud cover, lightning frequency, upper atmosphere chemistry and even mutation rates of surface, deep-earth and deep-sea organisms.

The interaction of stellar winds and the interstellar medium is a general phenomenon, and thus all stars and planetary systems will have the astrospheric interfaces. Understanding the structure of the local interstellar medium is important in evaluating the cosmic ray environment and the potential habitability of nearby exoplanets.

SLICE was successfully launched April 21, 2013, at 4 a.m. EDT from the White Sands Missile Range in New Mexico. A preliminary look shows that the science experiment showed good data results. The payload was recovered. ■

The University of Colorado science team works on the SLICE instrument during integration testing at NASA's Wallops Flight Facility. Photo credit: NASA/Wallops/Berit Bland

GODDARD MEMORIAL EVENT: HONORING THEIR SACRIFICE

By: Dewayne Washington

On the morning of May 7, 2013, Goddard's Veterans Advisory Committee (VAC) partnered with the Asian Pacific American Advisory Committee (APAAC) to co-host the Goddard Memorial Day commemorative event and recognition of Asian Pacific American Heritage Month. This year's guest speaker was Ken Niumatalolo, head football coach at the U.S. Naval Academy.

"Honoring Their Sacrifice" was the theme for the third annual event attended by more than 100 Goddard community members. The ceremony was also viewed by countless others in their offices and at Goddard satellite locations. Goddard Deputy Director, Arthur 'Rick' Obenschain, introduced Coach Niumatalolo. "We are very proud of the contributions our veterans have made to this country," said Obenschain.

The first Samoan collegiate head coach on any level, Niumatalolo will be entering his sixth season as Navy's coach and has already compiled an impressive record. Coach Niumatalolo is only the second coach since World War II to lead Navy to a winning record in his first three years. He is the first Navy football coach to lead the team to a bowl game in his first three seasons, also winning the Commander-In-Chief's trophy in his first two years.

Coach Niumatalolo began his remarks thanking all who were involved in the commemoration and for inviting him. "I feel very honored and privileged to be here today. There are some very smart people here and you do things for our country and humanity so that we can live better lives," said Niumatalolo. "I am impressed with what you accomplish here."

He gave a special recognition to invited guest Coach Brian 'Hawk' Hawkins and talked directly to his youth team, the Upper Marlboro Gators. "I would also like to commend Coach Hawk for teaching you about service, remembering veterans and what this country is about," said Niumatalolo. "Your coach is a wonderful man for bringing you here today."

During his address, Coach Niumatalolo talked about growing up in Hawaii, his dad's enlistment in the Coast Guard and how that had prepared him to become head coach at the Naval Academy. "I am not a veteran, I am just a football coach but I recognize the blessings because of the great sacrifices of those who came before us," he said.

Niumatalolo named several football players he had coached who gave their life while serving. "All of us are indebted to those who have made the ultimate sacrifice," he said. "We cannot repay them but we can honor them by remembering."

In developing football players while preparing these young men to become military officers, the coach said he uses the acronym "LEAD." To those you lead Love them, be a living Example, Appreciate their efforts, and help them Develop. "Coaching at the Naval Academy is more than teaching about football," said Niumatalolo. "It is teaching them leadership and the great responsibility they have coming when they will have to serve our country."

A Joint Armed Services Color Guard presented the United States flag while current and former members of the singing group "The Chromatics" sang the National Anthem to open the program. Also during the program, Phuc Nguygen, APAAC co-Chair, and Madison Townley, former VAC co-Chair, provided opening remarks.

Mark Hubbard, VAC chair, was unable to attend in person because work commitments required that he travel out of town. "I was blown away by this event," said Hubbard after listening in from a remote location. "It was a beautiful tribute and I appreciate the great work everyone did to make this happen. You make me proud to be an American, a veteran and a member of the Goddard family. To me it was a fitting tribute 'Honoring Their Sacrifice'." ■

Photo credit: NASA/Goddard/Pat Izzo

i am goddard

By: John M. Putman

ALL ABOUT PEOPLE

Jeff Northey is all about people. He understands that respecting and valuing fellow employees' input is critical for creating a positive work environment. Northey embodies the "i am goddard" principal that each individual contributes to Goddard's success.

Northey leads the Strategic Communications Office for the Independent Verification and Validation (IV&V) Facility in Fairmont, W. Va. Through his 10 years at IV&V, Northey has seen a change in the culture. "It's important to hear people out. I remember a time when opposing opinions were not taken well by management. People were uncomfortable sharing their perspectives, and it put a damper on work quality. I learned a lot during that time."

Having risen through the ranks at IV&V, Northey appreciates the importance of listening. There is now an open door policy where you can walk into the director's office. Northey sees this as a great sign. "The culture has improved. There is a lot of opportunity to be open and clear with opinions on change."

Northey respects and values the opinions of others. He believes that people should be comfortable speaking their mind. They can discuss the problems, and they should also have solutions in mind.

"Today, I try to create an environment where people are comfortable speaking their mind. We work as a team. It is important for me to listen to varying opinions and not react poorly to criticism. I have found that when a person's ideas are genuinely considered, they can commit to the outcome even if their idea is not selected."

Jeff Northey believes that by recognizing and respecting each person's strengths, we build a culture that enables us to maximize our value. He embraces diversity of opinion when forming teams, soliciting suggestions, evaluating ideas, and charting a future course of action. Jeff Northey is all about people. ■

Below: Jeff Northey creates a positive work environment.
Photo credit: NASA/Goddard/Pat Izzo